

# **Ouachita River Toxicity Identification and Evaluation Proposal**

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## **SECTION 1 INTRODUCTION**

### **1.1 Scope and Objectives**

The purpose of this investigation is to determine if the Ouachita River, which is the receiving water of the Georgia-Pacific Crossett (G-P) paper mill discharge, Part 1) has recurring toxicity to aquatic life and Part 2) identify the pollutant(s) causing or expected to cause toxicity. A section of the Ouachita River, from the Fesenthal lock and dam to the Louisiana state line, is proposed for addition by EPA to Arkansas's 2010 and 2012 303(d) List based on a 2007 UAA study that documented toxicity in the Ouachita River. This investigation is necessary for TMDL purposes because the cause of toxicity observed in the 2007 UAA study is unknown. The Ouachita River area for this study is located in southern Arkansas below the Felsenthal Lock and Dam and upstream of the Louisiana state line. The study area consists of Coffee Creek (at the confluence of the Ouachita River) and the Ouachita River, a short distance upstream and downstream of the confluence with Coffee Creek. Figure 1 shows the area of investigation including Crossett, Arkansas and the G-P Crossett Facility.

### **1.2 Existing Information**

Listed in Table 1 are the only studies of the Ouachita River, Mossy Lake, and Coffee Creek that EPA is aware of. In a March 2002 letter, Louisiana Congressman John Cooksey requested that EPA assess the impact of the G-P discharge on the Ouachita River. In response EPA hired Parsons to assess existing data. Parsons published the Water Quality Data Assessment for the Ouachita River, Between Felsenthal reservoir Lock and Dam, Arkansas and Sterlington, Louisiana in January 2003. A major finding of this initial review was that available data on water quality was very limited. Thus, an additional project was conducted to address the data gaps and to assess potential aquatic life uses of Coffee Creek and Mossy Lake, and assess water quality in Coffee Creek, Mossy Lake and the Ouachita River. This study was also conducted by Parsons and published in 2007. The 2007 study's major findings were toxicity in water and sediment samples from the Ouachita River, Coffee Creek, and Mossy Lake. In addition, several organics (fluoranthene and anthracene) and metals (cadmium, zinc) were found to be exceeding sediment benchmarks for aquatic life.

**Table 1.** Known studies of the Ouachita River, Mossy Lake, and Coffee Creek watershed

<b>Study Title</b>	<b>Date</b>	<b>Agency/Author</b>
Fish studies of the Caddo, Little Missouri, and Ouachita Rivers, Ouachita River Basin, Arkansas. Aquatic habitat group. Environmental Laboratory Waterways Experiment Station	1984	John A. Baker
Water and Sediment Quality of the Lower Ouachita River, FTN Associates, Ltd., Lower Ouachita River Work Group, Dr. Joe Nix, Ross Foundation.	1996	FTN Associates, Ltd
TMDLs for Segments Listed for Mercury in Fish Tissue, for the Ouachita River Basin, and Bayou Bartholomew, Arkansas and Louisiana to Columbia	2002	FTN Associates, Ltd
Final Draft Data Assessment for Water Bodies in the Ouachita River Basin Listed for Dioxin on the Louisiana Department of Environmental Quality's 1999 CWA Section 303(d) List.	2002	Parsons for EPA
Water Quality Data Assessment for the Ouachita River, between Felsenthal Reservoir Lock and Dam, Arkansas and Sterlington, Louisiana	2003	Parsons for EPA
Use Attainability Analysis and Water Quality Assessment of Coffee Creek, Mossy Lake, and the Ouachita River	2007	Parsons for EPA

### **1.3 Existing Monitoring Data**

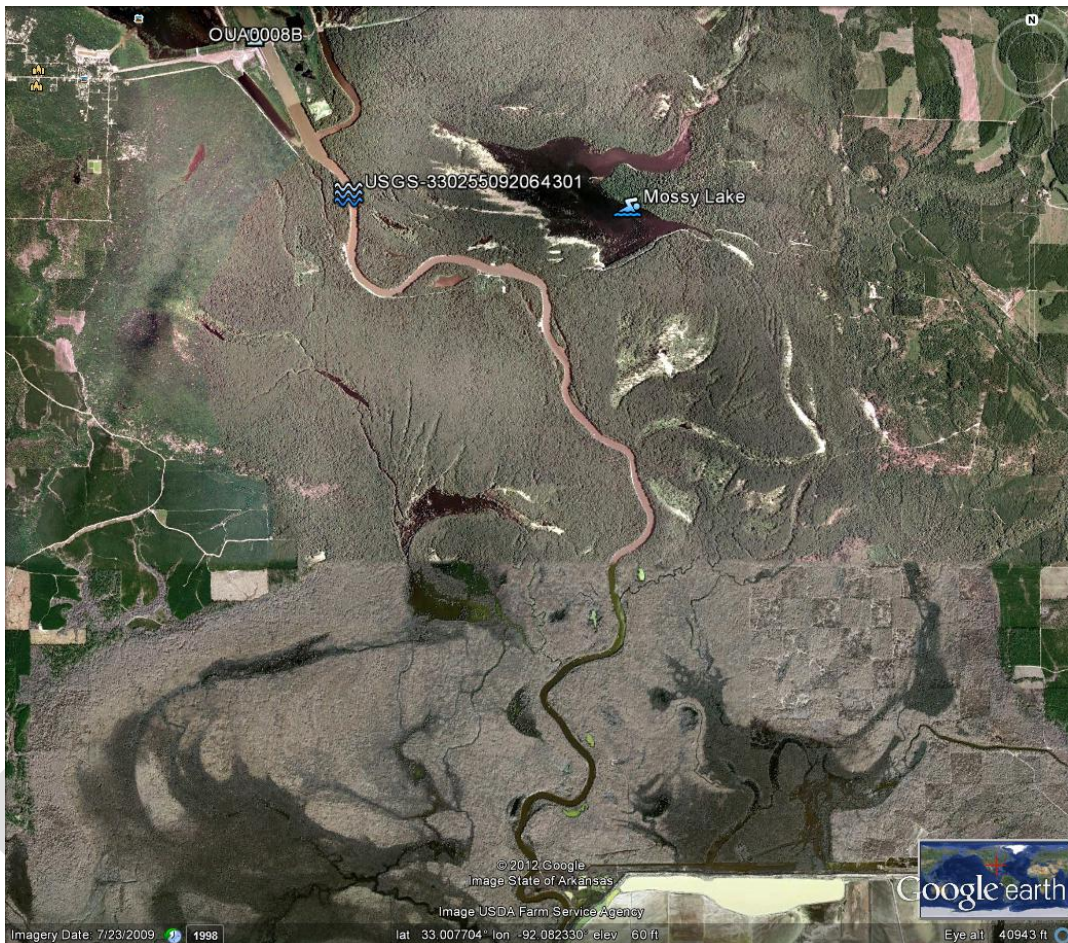
Mossy Lake and Coffee Creek fall within GP Crossett's private property and as such there are no monitoring stations on these two waterbodies. GP Crossett conducts routine monitoring at Outfall 001, per permitting requirements. The Ouachita River has several stations monitored by USGS and the ADEQ. The USGS stations are upstream from the confluence with Coffee Creek (Station 330255092064301) and below the confluence between the Louisiana-Arkansas border and Sterlington, LA (Station 7364535). The ADEQ has one station (OUA0008B) located above the Felsenthal lock and dam. All data from all stations is limited to basic water quality parameters.

# PART 1 CONFIRMATION OF TOXICITY

## SECTION 2 METHODS

### 2.1 Sample Site Descriptions

Figure 1 provides a satellite view of the study sites to be investigated. The figure also denotes the only two monitoring stations on this reach of the Ouachita River, OUA008B and USGS-330255092064301.



**Figure 1.** Google Earth view of Mossy Lake, Coffee Creek, and the Ouachita River

#### 2.1.1 Ouachita River

The headwaters of the Ouachita River are in the Ouachita Mountains near Eagleton, in western Arkansas. The water flows southeast to form Lake Ouachita near Hotsprings, Arkansas. The River then continues south through a series of lakes, including Felsenthal Reservoir, approximately 6-miles upstream from the Arkansas-Louisiana border. The Ouachita River then flows through northeast Louisiana and joins the Tensas River to form the Black River. The Black River is a large tributary to the Red River, which is a tributary of the Mississippi River. A chain of locks and dams on the river was initiated by the Vicksburg District, U.S. Army Corps of Engineers in the 1960s with the objective being to link the ports along the Ouachita River to the Gulf of Mexico. This was achieved in 1984 with completion of the H. K. Thatcher and Felsenthal locks and dams in southern Arkansas. These locks, along with Columbia and Jonesville locks in Louisiana, now provide year-round 9-foot navigation to Camden, Arkansas.

The 6 miles of the Ouachita River between Felsenthal Dam and the state line has a flat gradient (<0.5 feet/mile), steep cut sandy banks, deep channel, no riffle areas, a heavy sediment load, and a bottom characterized as shifting sand and silt (LORWG 1993).

### **2.1.2 Mossy Lake and Coffee Creek**

GP Crossett's paper mill (NPDES permit number AR 0001210) has been permitted to discharge 48.5 MGD to the Ouachita River via Coffee Creek and Mossy Lake. According to the provisions of this permit, Georgia Pacific is allowed to discharge effluent to Coffee Creek and Mossy Lake via Outfall 001. The outlet of Mossy Lake is to the Ouachita River and is considered Outfall 002. The effluent is primarily composed of wastewater from paper production operations, including the plant's sanitary facilities. Other wastewater discharges from the facility include approximately 1.6 MGD added by its building products operations, 0.4 MGD resulting from its chemical plant operations, and an additional 1.0 MGD of treated sanitary wastewater contributed by the City of Crossett. Prior to discharge, the effluent is treated by screening, primary clarification, settling, and stabilization in an aerated basin. The aerated basin discharges via Outfall 001 to Coffee Creek, which flows into Mossy Lake. Coffee Creek and Mossy Lake provide some measure of dilution and effluent polishing by natural degradation processes and are considered by the state of Arkansas to be part of GP's treatment processes. Mossy Lake discharges to the Ouachita River through Outfall 002.

### **2.1.3 Station 1- Reference Site**

The Reference Site is located at the crossing of the historical channel of Coffee Creek by Ashley County Road 221 with coordinates of approximately 33°05.659'N 92°02.356'W. The Reference Site has a natural historic watershed area of approximately 11.5 square miles. Due to the redirection of flow by GP the current watershed size at the reference site is estimated at approximately 2 square miles. This site is above the confluence with the GP 001 outfall, however, when the Ouachita River reaches 75 feet msl the backwaters of the flooded Ouachita River cause the GP discharge waters to potentially mix with the upper reach of Coffee Creek, including the Reference Site. This means there may be episodic influences on this site from the GP 001 outfall. This site was selected because it was the only site that provided reasonable expectation of the condition of an undisturbed stream in this system. Moving farther upstream to avoid the potential impact from GP 001 outfall was not practical due to the low flow in the system.

### **2.1.2 Station 2- Coffee Creek below Mossy Lake at confluence of Ouachita River**

This station is downstream from Outfall 002 where Mossy Lake discharges to the Ouachita River. An attempt should be made to collect samples that would be representative of Coffee Creek but distinct from the Ouachita River.

### **2.1.3 Station 3- Ouachita River near USGS Station 330255092064301 (Approximately 100 Yards Upstream of Coffee Creek Confluence)**

The upstream site on the Ouachita River is located at approximately 33°01.936'N 92°05.132'W. Samples should be collected near mid-stream next to the Coast Guard channel buoy.

### **2.1.4 Station 4- Ouachita River Approximately 1 Mile Downstream of Coffee Creek Confluence**

The downstream site on the Ouachita River is located at approximately 33°00.896'N 92°04.599'W. Samples should be collected near mid-stream next to the Coast Guard channel buoy.

## **2.2 Physical Habitat Assessment**

The ADEQ method for physical habitat assessment of Gulf Coastal Plains Ecoregion streams will be used (modified from Barbour et al., 1998). A qualitative (visual estimates) and quantitative (in-stream measurements) approach will be used to develop a habitat profile for each sample reach based on eight broad categories. These categories include measurements/estimates of the in-channel cover, substrate, canopy cover, large woody debris within bankfull width, flow and visual riparian and human influence estimates. Each tier employs a comparative metrics approach, using a simple scoring protocol that enables quantitative comparison of sites with each other and reference site conditions.

## **2.3 Sample Collection Methods**

The water quality assessment tasks of this investigation will include collection of water quality measurements and samples for laboratory analysis from 3 stations on the Ouachita River and 1 station on Coffee Creek. Media sampled will include sediment and water samples. Data collected will be compared to Arkansas Administrative Code (ACC) Regulation 2 numerical water quality standards and narrative criteria in Chapter 4 of Regulation 2.

### **2.3.1 Sample Collection, Field Water Quality Parameters**

For Phase I, field water quality parameters will be measured with an YSI 2030 meter and will include the following: temperature, DO, conductivity, pH, alkalinity, hardness, and acidity. Field measurements of water quality will be taken at a depth of 1 foot below the water surface, if conditions allow. Physical water conditions at 1 foot below water surface (i.e. observed color, flow severity, and any anomalies) will be recorded as well as GPS coordinates of sample sites for future reference. Lastly, written observation/description of ambient field conditions will be recorded. All field data will be documented on data sheets found in Appendix A.

### **2.3.2 Sample Collection, Water and Sediment Methods**

Table 2 provides a list of the sampling and handling procedures to be used by the field crew. Field water and sediment samples will be collected using grab sample methods. Samples will be collected in an area undisturbed by the field team, with samples being collected facing upstream (when wadeable) to minimize disturbance of water conditions. When flow conditions are extremely low, samples should be taken from the bank to avoid disturbance of the sediment. Samples will be collected 1-foot under the water surface unless conditions are deemed unfavorable by the field team manager. Sediment samples should be collected according to EPA methods (See: <http://water.epa.gov/polwaste/sediments/cs/upload/ch4.pdf>). Composite sediment samples at the Coffee Creek station will be sampled with a shovel, plastic tubs, and stainless steel spoons while an Eckman sediment sampler (or comparable device) will be used at the river sample sites. Approximately the top 1 inch of sediment should be collected and immediately placed in an appropriate container on ice. All composite sediment samples should be thoroughly homogenized before preparing the samples for shipment.

**Table 2. Field Sampling and Handling Procedures**

Parameter	Matrix	Container/Volume	Preservation	Holding Time
<i>Laboratory analysis</i>				
Acute/Chronic Toxicity	Water	1 gallon cubitainer	4°C	36 hours
Acute/Chronic Toxicity	Sediment	1 liter glass (wide mouth)	4°C	14 days
Chloride, Sulfate, TSS, TDS	water	1 liter HDPE	4°C	7 days TSS & TDS, anions 28 days
<i>Field analysis</i>				
Ammonia	water	Hach NH <sup>3</sup> Test Kit	N/A	N/A
pH	water	<i>in situ</i>	N/A	N/A
Dissolved Oxygen (DO)	water	<i>in situ</i>	N/A	N/A
Temperature	water	<i>in situ</i>	N/A	N/A
Alkalinity	water	<i>in situ</i>	N/A	N/A
Hardness	water	<i>in situ</i>	N/A	N/A
Conductivity	water	<i>in situ</i>	N/A	N/A
Acidity	water	<i>in situ</i>	N/A	N/A

### 2.3.3 Water and Sediment Sample Shipping and Handling Procedures

All field samples must be placed on ice immediately after collection and maintained at 4°C until arrival at the laboratory for analysis. A chain of custody form (Appendix B) should be completed and accompany any samples shipped to the lab. For toxicity analyses, the ambient toxicity testing -- Lab Sample Form (Appendix C) must also be completed and shipped with samples. Lastly, notification must be given to the USEPA Houston laboratory 2 weeks before shipping toxicity testing samples.

### 2.3.4 Laboratory Analysis Methods

Parameter	Units	Matrix	Method	Responsible Agency
Acute Toxicity ( <i>C. dubia</i> and <i>P.promelas</i> )	Lethal	Water/Sediment	600/4/90/027F; 600/R-94/024	USEPA Houston Lab
Chronic Toxicity ( <i>C. dubia</i> and <i>P.promelas</i> )	Sublethal	Water/Sediment	821-R-02-013; 600/R-94/024	USEPA Houston Lab
Nitrite, Chloride, Sulfate, TSS, TDS	mg/L	Water/Sediment		USEPA Houston Lab

# APPENDIX A

## Field Data Sheet

Date:

Station:

Field crew:

Latitude:

Longitude:

Arrival time at  
station:

Sampling start time:

Physical Habitat Assessment					
Parameter	Time	Result	Units	Instrument	Initials
Temp (air)					
Flow condition					
Odor					
Color					
Field Water Quality Measurements					
Parameter	Time	Result	Units	Instrument	Initials
Temperature					
DO					
pH					
Alkalinity					
Acidity					
Ammonia					
Conductivity					
Hardness					
Field Notes					

## **APPENDIX B**

# **US FWS Chain of Custody Form**

# APPENDIX C

## Ambient Toxicity Testing -- Lab Sample Form U.S. EPA Region 6

Be sure to contact Christy Warren at least two weeks prior to shipping samples!!

Christy Warren 6MD-HI  
U.S. EPA Region 6  
Inorganics Section  
10625 Fallstone Road  
Houston, TX 77099  
(281) 983-2137

Submitting Organization:

Site (Waterbody):

Site Id No. (Station No):

Latitude/Longitude (if available):

Date / Time Collected:

Collected By:

Phone Number:

E-mail Address:

Needed for testing:

1 gallon water

1 liter of sediment (wide mouth container)

Ship samples for delivery within 24 hours of collection, *on ice*